CORRECTED DIRECT TESTIMONY OF

HENRY E. DELK, JR.

ON BEHALF OF

DOMINION ENERGY SOUTH CAROLINA, INC.

DOCKET NO. 2022-2-E

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS AND POSITION WITH DOMINION ENERGY SOUTH CAROLINA, INC. ("DESC" OR "COMPANY").

A. My name is Henry E. Delk, Jr., and my business address is 400 Otarre Parkway, Cayce, South Carolina 29033. I am employed by DESC as Director, Power Generation.

Q. DESCRIBE YOUR EDUCATIONAL BACKGROUND AND YOUR BUSINESS EXPERIENCE.

A. I graduated from Clemson University in 1993 with a Bachelor of Science degree in Mechanical Engineering and earned a Master of Business Administration from the University of South Carolina in 2000. I began my career with Milliken & Company in 1993 working as a Process Improvement Engineer. After three years, I accepted a position with Clariant Corporation as a Project Engineer.

I began my career with DESC, then South Carolina Electric & Gas Company, in 1997 in the Rate Department as a Rate & Regulatory Specialist. In 2000, I transferred to Electric Transmission and assumed a position within the System

Control department as a System Controller. Within Electric Transmission, I served as Supervisor/Manager of Operations Planning from 2001 to 2007 and Manager of System Control from 2007 to 2012. I transferred to the Electric Operations division in 2012 to 2013 working as Manager of Northern Division Transmission Operations and Local Manager of the Lexington and Chapin Crew Quarters. From 2013 to 2014, I served as Director of Power Marketing. I assumed the role of General Manager, Fossil Hydro Technical Services in June 2014. I assumed my current position in September 2017.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to review the operating performance of DESC's non-nuclear power generation units and South Carolina Generating Company's ("GENCO") A.M. Williams Electric Generating Station ("Williams Station") during the period January 1, 2021, through December 31, 2021 ("Review Period").

Q. CAN YOU BRIEFLY DESCRIBE DESC'S NON-NUCLEAR POWER GENERATION FACILITIES?

A. DESC currently operates three coal-fired steam units, one dual fuel (coal and/or natural gas) steam unit, three gas-fired steam units, 11 combined-cycle combustion turbine/steam generator units (gas/oil fired), 16 simple-cycle combustion turbines (nine of which are now slated to be retired and replaced with

three units in the near future), 23 hydroelectric generating units throughout four facilities, and eight pumped storage units in a single facility. The total net non-nuclear summer and winter generating capability rating of these facilities as of November 2021 is shown in Table 1 below. The ratings shown therein are updated on an annual basis.

Table 1

DESC Non-Nuclear Power Generation Capacity (Net Megawatts)		
	Summer Rating	**Winter Rating**
Combined Cycle	1,840	2,005
Coal-Fired Steam	1,289	1,294
Dual-Fuel Coal and/or Gas-Fired Steam	415	415
Gas-Fired Steam	345	346
Simple Cycle Combustion Turbines	301	352
Hydroelectric	208	224
Pumped Storage Hydroelectric	576	576
Total	**4,974**	**5,212**

Q. HAVE THERE BEEN ANY CAPACITY RATING CHANGES FOR NON-NUCLEAR POWER GENERATION FACILITIES?

A. Yes. The ratings in Table 1 reflect the addition of the Advanced Gas Path ("AGP") upgrade completed on combustion turbine #3 at the Jasper Station. The AGP upgrade provided an additional 11 MW of capacity to that unit (both during Summer and Winter seasons). This AGP upgrade was also completed on

combustion turbine #2 at Jasper Station in late Fall 2021. That upgrade, along with the future upgrade of combustion turbine #1 and the two combustion turbine units at Columbia Energy Center, will be reflected in future capacity rating updates.

The ratings in Table 1 also reflect the Company's decision to not repair the Bushy Park 'A' combustion turbine and the Parr #1 combustion turbine because these units (along with Bushy Park 'B' and Parr combustion turbine units #2, #3, and #4) will be replaced in accordance with the Partial Settlement Agreement entered into by the Company in Docket No. 2021-93-E as part of its Peaking Generation Replacement efforts.

Q. DOES DESC OPERATE RENEWABLE GENERATORS?

A. Yes. DESC also owns and operates a thin film laminate solar generation system on ten acres of rooftop at Boeing's North Charleston production facility. This system has a nameplate rating of 2.6 MW-DC. The Company has also interconnected approximately 900 MW-AC of renewable energy under existing Power Purchase Agreements ("PPAs").

Q. WHAT IS GENCO AND WHAT IS GENCO'S RELATIONSHIP TO DESC?

A. GENCO was incorporated on October 1, 1984, as a SCANA Corporation subsidiary, and GENCO owns Williams Station, a coal-fired steam plant. GENCO sells DESC the total capacity and entire output from the Williams Station under a Unit Power Sales Agreement approved by the Federal Energy Regulatory

Commission. For purposes of this testimony, I include Williams Station when I refer to DESC's coal-fired steam plants.

Q. HOW MUCH ELECTRICITY DID DESC GENERATE DURING THE REVIEW PERIOD?

A. In the Review Period, DESC generated ~~23,794,063~~approximately 21,462,792 megawatt hours ("MWH") of energy. That energy is broken down as follows:

- the coal-fired steam units and the dual fuel steam unit (Cope Station when fired by coal) generated approximately ~~21.8~~21.9% of that amount;
- the combined-cycle units generated approximately 44.4%;
- the nuclear plant generated approximately 21.7%;
- the gas-fired steam units (Urquhart Unit No. 3 and McMeekin Unit Nos. 1 & 2) and the dual fuel steam unit (Cope when fired by natural gas) generated approximately ~~8.7~~8.6%;
- the peaking gas turbines and hydro units generated approximately 3.3%; and
- the DESC-owned solar generation facility generated less than 1%.

Q. CAN YOU SUMMARIZE THE PERFORMANCE OF THE COMPANY'S GENERATING UNITS?

A. DESC's Power Generation facilities operated efficiently and dependably during the Review Period as shown by the resulting Availability Factor and Forced Outage Factors for the Review Period. Availability Factor is a measure of the actual hours that the generation units are available (overall readiness to provide electricity) divided by the total hours in the Review Period. Availability is not affected by how the unit is dispatched or by the demand from the system when connected to the grid. However, it is impacted by the planned and unplanned shutdown hours. Forced Outage Factor is the percentage of the total hours that generating units are forced out of service (for various reasons) compared with the number of hours in the period.

DESC's coal and natural gas-fired steam units and combined-cycle units, which I refer to collectively as the "fossil units," had an Availability Factor of 80.40% with an availability during the peak demand months of January, February, June, July, August, and December of ~~88.52~~88.51%. When Wateree Unit 2 is excluded from this calculation, the Availability Factor was 85.13% for the remaining units for 2021.

DESC's fossil units had a Forced Outage Factor of 7.47% during the Review Period. When Wateree Unit 2 is excluded from this calculation, the Forced Outage Factor for the remaining units was 2.02%.

Q. PLEASE DISCUSS THE SIGNIFICANT PROJECTS UNDERTAKEN DURING DESC'S MAINTENANCE OUTAGES FOR THE REVIEW PERIOD.

A. As part of the Company's ongoing maintenance program, DESC undertook a number of significant projects during its maintenance outages in this Review Period. A brief description of major work is as follows:

Jasper Station – Spring 2021

Jasper completed a Spring 2021 planned outage beginning on March 7, 2021 and ending April 17, 2021. Major work during this outage included: Unit 3 major inspection including hot gas path inspection, Advanced Gas Path upgrade, turbine control system upgrade, generator field replacement, boiler feed pump motor replacement and motor inspection, feedwater control valve inspection, and inlet filter preservation.

McMeekin Station – Spring 2021

McMeekin completed a Spring 2021 planned outage beginning on April 4, 2021 and ending May 5, 2021 for Unit 1 and beginning on April 15, 2021 and ending May 23, 2021 for Unit 2. Major work during this outage included: Unit 1 steam turbine valve inspection, Units 1 & 2 valve motor control center replacement, air heater basket and seal replacements, Unit 2 boiler feed pump rotating element

replacement and air heater expansion joint replacement, and high energy pipe inspection.

Urquhart Station – Spring 2021

Urquhart completed a Spring 2021 planned outage beginning on April 15, 2021 and ending May 25, 2021 for Units 2 & 6. Major work during this outage included: Unit 6 hot gas path inspection, Unit 2 steam turbine minor valve inspection and 4160V switchgear five-year inspection and cleaning, Units 2 & 6 balance of plant relay inspections, condensate pump motor inspections, Unit 6 heat recovery steam generator stack silencers replacement and high energy pipe inspection.

Williams Station – Spring 2021

Williams completed a Spring 2021 planned outage beginning on March 21, 2021 and ending May 9, 2021. Major work during this outage included: wet flue gas desulfurization blowdown pond stabilization, superheater boiler tube replacement, waterwall tube inspection, pulverizer gearbox refurbishment, service water pump inspection, induced draft fan damper replacement, low pressure condenser expansion joints replacement, seal water booster pump inspection, induced draft fan motor and fly ash vacuum blower motors overhauled, inverter transformer replacement, motor operated valve maintenance, selective catalytic reduction and boiler ductwork vacuuming, and scrubber inspection.

Jasper Station – Fall 2021

Jasper Station completed a Fall 2021 planned outage beginning on October 16, 2021 and ending on November 19, 2021 for Unit 3, November 20, 2021 for Units 1 & 4 and December 7, 2021 for Unit 2. Major work during this outage included: Unit 2 major inspection including hot gas path inspection; Advanced Gas Path upgrade; turbine rotor replacement and gas turbine controls upgrade; Unit 4 steam turbine generator inspection; steam turbine valve and bearing inspection; condenser expansion joint replacement; heat recovery steam generators 1, 2, & 3 transition upgrades; boiler feed pump replacement, motor bus transfer upgrades, Units 1 & 2 non-return valve replacement and motor inspection; circulating water pump motor inspection; and installation of a redundant main fuel gas filtration system.

Williams Station – Fall 2021

Williams completed a Fall 2021 planned outage beginning on August 28, 2021 and ending October 4, 2021. Major work during this outage included: essential service motor control center replacement, variable frequency drive maintenance, 'B' condensate booster pump motor, injection pump and absorber recycle pump motor overhauls, inverter transformer replacement, deaerator heater replacement, scrubber absorber inspection, induced draft fan damper replacement, and selective catalytic reduction catalyst replacement.

Q. PLEASE DISCUSS ANY SIGNIFICANT FORCED OUTAGES FOR THE PERIOD UNDER REVIEW.

A. DESC's Power Generation group defines a significant forced outage as any forced outage in excess of seven days for a generation facility with more than 100 megawatts of generating capacity. DESC had three significant forced outages during the Review Period:

Wateree Unit 2

As DESC advised the Commission in previous hearings, Wateree Unit 2 experienced a forced outage beginning on February 19, 2020 when a hydrogen/air mixture resulted in a small explosion causing damage to the stator section of the main generator. This unit remains out of service while repairs are being made.

The Company is pleased to report that the replacement stator mid-section for Wateree Unit 2 is en route to the Port of Charleston. The vessel carrying the replacement stator is on schedule for delivery to the Port of Charleston where the generator will be offloaded and delivered by the Norfolk Southern Railway to the Wateree Station site. This unit is scheduled to return to service this Spring.

Columbia Energy Center ("CEC")

CEC has two circulating water pumps that are both in service during normal operation; however, the plant can achieve near-full load capability with only one pump in service. On September 30, 2021, one circulating water pump experienced

a broken impeller and was sent to a large pump repair facility. The plant remained in operation during this period with a small 15 MW derate for a 540 MW rated facility.

On October 12, 2021, CEC operators recognized a rapid drop in pH levels in its boiler steam/water system. Water treatment efforts were immediately implemented to keep the units online, however, those efforts were unsuccessful, and the entire plant was shut down to protect critical equipment, including the heat recovery steam generators and steam turbine. Samples taken determined that water contamination had spread throughout the entire plant water system; mitigation and cycle cleanup exercises began immediately to drain and flush all plant water systems.

Dominion Energy's Central Laboratory determined the root cause of the chemistry excursion to be hydrochloric acid from the plant's water treatment equipment leaking into the plant's demineralized water system. During an early October outage, an acid valve was replaced in the water treatment system. During installation, this valve was misaligned causing damage to the valve seat which allowed the hydrochloric acid to leak by (undetected) into the demineralized water make-up system.

Unrelated to the issues with the pH levels, CEC experienced a failure of the second circulating water pump on October 14, 2021, which rendered the entire

power block unavailable and prevented water cleanup activities from continuing. On November 4, 2021, the plant placed a rebuilt circulating water pump back in service and continued water cleanup efforts until November 12, 2021, when Unit 1 and 3 were returned to service. These units operated to allow flushing and treatment of the entire plant water system until acceptable chemistry parameters were achieved. Unit 2 returned to service November 18, 2021.

The Company has procured spare parts to be held in inventory to allow for the immediate rebuild of either circulating water pump as necessary in the future. In addition, a spare pump and motor for the pump have been ordered. Following this event, all water treatment acid valves were also replaced and realigned. The plant has also added additional on-line water chemistry analyzers to immediately detect chemistry excursions in the future.

Urquhart Unit 6

Urquhart Unit 6 experienced a forced outage that began on December 18, 2021, due to the structural blowout of two combustion cans on the combustion turbine. Urquhart Unit 6 was in a scheduled outage from December 11 to December 18, 2021, during which time two combustion cans were replaced. On December 18, 2021, the unit was placed into service in order to perform a series of fuel checks on the unit. The unit tripped approximately two minutes after the breaker closed to tie the unit onto the grid. The Company and General Electric International ("GE"), the

vendor who had performed the outage work, determined that during replacement of the combustion cans GE had failed to remove and reinstall the liner caps from the old cans into the new cans. GE immediately mobilized crews that worked around-the-clock over the holiday season to repair the unit. Urquhart Unit 6 returned to service on January 3, 2022. GE continues its full root cause analysis on the issue.

Q. WHAT WAS DESC'S FOSSIL SYSTEM FORCED OUTAGE FACTOR FOR THE PERIOD UNDER REVIEW?

A. For the Review Period, DESC's fossil units experienced a system Forced Outage Factor of 7.47%. When Wateree Unit 2 is excluded from this calculation, the Forced Outage was 2.02%.

DESC's Forced Outage Factor of 25.18%~~14.40%~~ for coal-fired units was largely driven by the Wateree Unit 2 outage; when this unit is excluded from the data, DESC's coal units had a Forced Outage Factor of 0.23%, which compares very favorably to the five-year (2016-2020) national average of 5.26% for forced outage factors on all coal-fired units as reported by the North American Electric Reliability Corporation ("NERC") Generating Availability Data System ("GADS") database.

DESC's Forced Outage Factor of 3.06% for its combined-cycle units was comparable to the five-year (2016-2020) NERC GADS national average for combined-cycle units of 2.36%. The forced outages at Columbia Energy Center and

Urquhart Unit 6 were the primary drivers for the combined-cycle forced outage factor for the year.

DESC's gas-fired steam units Forced Outage Factor of 0.02% for the Review Period was much better than the five-year (2016-2020) NERC GADS national average of 5.46% for gas-fired steam units.

Q. PLEASE DISCUSS THE AVAILABILITY OF DESC'S FOSSIL PLANTS DURING THE REVIEW PERIOD.

A. For the Review Period, DESC's fossil units had an Availability Factor of 80.40%. When Wateree Unit 2 is excluded from this calculation, the Availability Factor was 85.13%.

DESC's availability for its coal-fired units for 2021 was 61.56% primarily due to lengthy planned outage work at Williams Station, a planned derate at Cope Station for electric transmission system work, along with Wateree Unit 2 remaining in forced outage status while it awaits the replacement of its generator stator. When Wateree Unit 2 is excluded from this calculation, the Availability Factor was 82.08% for the remaining units. For comparison purposes, the five-year (2016-2020) NERC GADS national average for availability from all coal-fired units was 82.29%.

DESC's combined-cycle Availability Factor of 85.34% was comparable to the five-year (2016-2020) NERC GADS national average for combined-cycle units

of 88.04%. Aside from the impact of forced outages at Columbia Energy Center and Urquhart, there were two major planned outages at Jasper in Spring and Fall for combustion turbine major inspections and upgrades that impacted availability in 2021.

DESC's gas-fired steam units' Availability Factor of 87.41% for the Review Period compared very favorably with the five-year (2016-2020) NERC GADS national average of 80.22% for gas-fired steam units.

Q. PLEASE EXPLAIN "HEAT RATE" AND DESCRIBE THE HEAT RATE OF THE NATURAL GAS-FIRED COMBINED CYCLE UNITS AND THE COAL-FIRED STEAM UNITS DURING THE REVIEW PERIOD.

A. Heat rate is a way to measure the thermal efficiency of a power plant. It is the number of British Thermal Units ("Btu") of fuel required to generate one kilowatt-hour ("kWh") of electricity. Simply put, the lower the heat rate, the more efficient the plant.

The natural gas-fired combined cycle unit average system heat rate for the Review Period was 7,505 Btu/kWh. Columbia Energy Center had the best heat rate on our system at 7,285 Btu/kWh. The most recent data published by the United States Energy Information Agency ("EIA") indicates that the national average heat rate for all natural gas-fired units in 2020 was 7,731 Btu/kWh.

The coal-fired steam unit average system heat rate for the Review Period was 9,989 Btu/kWh. Williams Station had the best heat rate for a coal-fired unit on our system at 9,924 Btu/kWh. For comparison purposes, the most recent data published by EIA indicates that the national average heat rate for all coal-fired units in 2020 was 10,655 Btu/kWh.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes.